REMARKS

Applicant appreciates the thorough examination of the application that is reflected in the Office Action dated July 24, 2002.

Claims 37, 51, 53, 54, 56, 62 and 63 were amended. Applicant submits that the amendments to these claims are not made for reasons related to patentability since the claims already distinguished over the cited references. Rather, the amendments clarify that the "hole injecting and transporting layer" is distinct from an anode layer and a cathode layer. To correct a translation error, claims 37, 38, 41, 43, 44, 56, 62 and 63 have been amended such that they now recite "ink-jet head" as opposed to "ink-jet recording head." The amendments to claims 37, 51, 53, 54, 56, 62 and 63 are supported throughout the specification and drawings, for example, in the text at page 22, line 3 through page 23, line 24. Claims 50, 52 and 58 are cancelled without prejudice or disclaimer. New claims 68-128 are added, and are supported throughout the specification and drawings, for example, in the text by original claims 38-49, and 51-54. Claims 37-49, 51, 53, 54, 56, and 62-128 are pending in the application.

Reexamination and reconsideration of the application, as amended, are respectfully requested.

Interview Summary

Applicant thanks the Examiner for the courtesies extended during the telephone interview of August 30, 2002. Applicant has amended claims 37, 51, 53, 54, 56, 62 and 63 as discussed during the telephone interview, and, as also discussed during the telephone interview, submits that those claims further distinguish over the cited references. Applicant summarizes the points made during that telephone interview below.

Objections to Claim 50

Claim 50 was objected to since it does not further limit claim 37 from which it depends. In response, claim 50 has been cancelled without prejudice, thereby rendering the rejection thereof moot.

Independent Claims 37, 56, 62, 63 and 113

Claims 37-53, 56, and 62-67 were rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,725,407 to Liu et al. (hereinafter Liu) in view of USPN 5,965,281 to Cao (hereinafter Cao) and Jonas '515 and further in view of USPN 5,667,572 to Taniguchi et al.

(hereinafter Taniguchi). To the extent the same grounds of rejection are applied to the amended claims, Applicant respectfully traverses these rejections for at least the following reasons.

Amended claims 37 relates to a manufacturing process for an organic EL element having a stacked structure including a hole injecting and transporting layer and a light-emitting layer formed within a partitioning member which is divided into individual pixel areas. The method comprises:

> forming an anode layer;
>
> forming the partitioning member above a substrate, the partitioning member having openings over at least a portion of the anode layer, the openings corresponding to pixel areas;
>
> forming a hole injecting and transporting layer by independently filling each of the openings with a composition for the hole injecting and transporting layer using an ink-jet head, the composition comprising (1) a conductive material containing at least a lubricant, polyethylene dioxythiophene, and polystyrene sulfonic acid, and (2) a solvent;
>
> drying the composition filled in the openings to form the hole injecting and transporting layer; and
>
> independently filling each of the openings with a light-emitting layer composition using an ink-jet head to form the light-emitting layer;
>
> forming a cathode layer over the light-emitting layer. (Emphasis added.)

Applicant respectfully submits that the cited references fail to teach or suggest numerous recitations of claim 37.

Applicant respectfully submits that all of the cited references fail to teach or suggest, for example, "forming a hole injecting and transporting layer by independently filling each of the openings with a composition for the hole injecting and transporting layer using an ink-jet head, the composition comprising (1) a conductive material containing at least a lubricant, polyethylene dioxythiophene, and polystyrene sulfonic acid, and (2) a solvent", as recited in claim 37. Even assuming for the sake of argument that there would be some motivation to combine the Jonas '515 reference and the Taniguchi reference, none of the cited references teach or suggest "forming a hole injecting and transporting layer by independently filling each of the openings with a composition for the hole injecting and transporting layer using an ink-jet head," as required by claim 37.

The Examiner at page 4 of the Office Action notes that "'515 teaches that a polythiophene films suitable for deposition as electrodes in EL devices (col. 3, lines 5-67 are formed using compositions including PEDT and PSS and a solvent."

At page 2, lines 7-9, Applicant discusses the general structure of a two-layer type structure element and notes that "a hole injecting and transport layer ... situated between the anode and the light-emitting layer." As such, the anode is distinguishable from the "hole injecting and transport layer." Amended claim 37 further reflects the distinction between these two layers.

As noted at col. 3, lines 31-34, the Jonas '515 reference does not teach or suggest using "polythiophene dispersions" to form a "hole injecting and transporting layer", as claimed, but instead "relates to electroluminescent systems which contain polythiophene dispersions according to the invention in the form of a transparent conductive layer or electrode." At col. 4, lines 28-33, Jonas '515 then goes on to note that "One or more intermediate layers can be additionally arranged between the electroluminescent systems and the electrodes. The intermediate layers – charge-carrier transporting substances—are known (for example from Appl. Phys. Lett. 57 (1990)531) and are defined therein as HTL (hole transport layer) and ETL (electron transport layer)."

Jonas '483 merely discloses scratch resistant conductive coatings, and fails to mention the use of such coatings in ink-jet printing applications or in the construction of electroluminescent elements. Jonas '483 mentions that mixtures taught therein may be applied by gravure printing, flexographic printing, screen printing, or by knife application, roll application, [or] curtain coating. Each of these techniques are far different than ink-jet printing and do not encounter the problems associated with ink-jet printing.

Liu discloses methods for manufacturing a luminescent display screen that features a sloping structure. The Examiner cites Liu as teaching the steps of forming partitioning members on a substrate having openings corresponding to pixels on a substrate and filing the openings with an anode material. Applicant notes that according to claims 37, 56, 62, 63 and 113, the

openings are not filled with an anode material, and moreover that in each of the amended claims "an anode layer" is distinguishable from the "hole injecting and transporting layer."

The Examiner cites Cao as disclosing "that polythiophene may be used as the anode instead of ITO (co. 10, lines 16-37)." Applicant notes that the amended claims do not disclose any specific material for the anode layer.[1] As discussed in the telephone interview, it appears that the Examiner failed to distinguish between the anode layer and the "hole injecting and transporting layer."

Thus, none of the cited references teach or suggest "forming a hole injecting and transporting layer by independently filling each of the openings with a composition ... comprising (1) a conductive material containing at least a lubricant, polyethylene dioxythiophene, and polystyrene sulfonic acid, and (2) a solvent", as recited in claim 37.

In addition, Applicant notes that the cited references fail to teach or suggest the concept of "independently filling each of the openings ...using an ink-jet head," as required by claim 37, let alone the concept of doing so in a manufacturing process for an organic EL element having a stacked structure ... using an ink-jet head, as required by claim 37. For at least this additional reason, the rejection of claim 37 should be withdrawn.

Consequently, the cited references fail to teach or suggest at least each of the above recitations of claim 37. Accordingly, the rejection of claim 37 and the claims 38-49, 51, 53 and 54 that depend therefrom should be withdrawn. Applicant respectfully submits that independent claims 56, 62, 63 and 113, and the claims 68-128 that depend therefrom, are also patentable over the cited references for at least the same reasons.

New claims

New claims 68-128 are added, and are supported throughout the specification and drawings, for example, in the text by original claims 38-49, and 51-54. Applicant submits that

[1] The specification mentions that anode 101 may be an ITO transparent electrode.

new claims 68-128 are patentable for at least the reasons discussed above with respect to independent claims 37, 56, 62, 63, and 113.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6793 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,

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Version with markings to show changes made:

37. (Four Times Amended) A manufacturing process for an organic EL element having a stacked structure including a hole injecting and transporting layer and a light-emitting layer formed within a partitioning member which is divided into individual pixel areas, the method comprising:

forming an anode layer;

forming the partitioning member above [the] a substrate, the partitioning member having openings over at least a portion of the anode layer, the openings corresponding to pixel areas;

forming a hole injecting and transporting layer by independently filling each of the openings with a composition for the hole injecting and transporting layer using an ink-jet [recording] head, the composition comprising (1) a conductive material containing at least a lubricant, polyethylene dioxythiophene, and polystyrene sulfonic acid, and (2) a solvent; [and]

drying the composition filled in the openings to form the hole injecting and transporting layer; and

independently filling each of the openings with a light-emitting layer composition using an ink-jet head to form the light-emitting layer;

forming a cathode layer over the light-emitting layer.

38. (Amended) The manufacturing process of claim 37, wherein the conductive material is contained in an amount of 0.01 wt% to 10 wt% of the composition, and wherein a contact angle between the composition and a material making up an ink discharge nozzle face of the ink-jet [recording] head is within the range of 30° to 170°.

41. (Amended) The manufacturing process of claim 37, wherein the conductive material is contained in an amount of 0.01 wt% to 10 wt% of the composition, wherein the composition has a viscosity of 1 to 20 cps, and wherein a contact angle between the composition and a material making up an ink discharge nozzle face of the ink-jet [recording] head is within the range of 30° to 170°.

43. (Amended) The manufacturing process of claim 37, wherein the conductive material is contained in an amount of 0.01 wt% to 10 wt% of the composition, wherein the composition has a surface tension of 20 to 70 dyne/cm, and wherein a contact angle between the composition and a material making up an ink discharge nozzle face of the ink-jet [recording] head is within the range of 30° to 170°.

44. (Amended) The manufacturing process of claim 37, wherein the conductive material is contained in an amount of 0.01 wt% to 10 wt% of the composition, wherein the composition has a viscosity of 1 to 20 cps and a surface tension of 20 to 70 dyne/cm, and wherein a contact angle between the composition and a material making up an ink discharge nozzle face of the ink-jet [recording] head is within the range of 30° to 170°.

Please cancel claim 50 without prejudice.

51. (Amended) The manufacturing process according to claim [50] 37, wherein the lubricant is glycerin.

Please cancel claim 52 without prejudice.

53. (Amended) The organic EL element of claim [52] 37, wherein a film thickness of the hole injecting and transporting layer is 0.1 μm or less.

54. (Amended) The organic EL element of claim [52] 37, wherein a film resistance of the hole injecting and transporting layer is in the range $0.5 \times 10^9\ \Omega/m^2$ to $5 \times 10^9\ \Omega/m^2$.

56. (Three Times Amended) A manufacturing process for an organic EL element having a stacked structure including a hole injecting and transporting layer and a light-emitting layer formed within a partitioning member which is divided into individual pixel areas, the method comprising:

forming an anode layer;

forming the partitioning member above [the] a substrate, the partitioning member having openings over at least a portion of the anode layer, the openings corresponding to pixel areas;

independently filling each of the openings with a composition for the hole injecting and transporting layer using an ink-jet [recording] head, the composition comprising at least a material for the hole injecting and transporting layer, a lubricant, and a polar solvent; [and]

drying the composition filled in the openings to form the hole injecting and transporting layer; and

independently filling each of the openings with a light-emitting layer composition using an ink-jet head to form the light-emitting layer;

forming a cathode layer over the light-emitting layer.

Please cancel claim 58 without prejudice.

62. (Three Times Amended) A method for manufacturing an electroluminescent display, the method comprising:

(1) manufacturing [an] a stacked EL element, wherein the step of manufacturing the stacked EL element comprises:

forming an anode layer;

forming a partitioning member above [the] a substrate, the partitioning member having openings over at least a portion of the anode layer, the openings corresponding to pixel areas;

independently filling each of the openings with a composition for a hole injecting and transporting layer using an ink-jet [recording] head, the composition comprising (a) a conductive material containing at least a lubricant, polyethylene dioxythiophene and polystyrene sulfonic acid, and (b) a solvent; [and]

drying the composition filled in the openings to form the hole injecting and transporting layer; and

independently filling each of the openings with a light-emitting layer composition using an ink-jet head to form the light-emitting layer;

forming a cathode layer over the light-emitting layer; and

(2) incorporating the [manufactured] stacked EL element into the electroluminescent display.

63. (Three Times Amended) A method for manufacturing an electroluminescent display, the method comprising:

(1) manufacturing [an] a stacked EL element, wherein the step of manufacturing the stacked EL element comprises:

forming an anode layer;

forming a partitioning member above [the] a substrate, the partitioning member having openings over at least a portion of the anode layer, the openings corresponding to pixel areas;

independently filling each of the openings with a composition for a hole injecting and transporting layer using an ink-jet [recording] head, the composition comprising at least a material for the hole injecting and transporting layer, a lubricant, and a polar solvent; [and]

drying the composition filled in the openings to form the hole injecting and transporting layer; and

independently filling each of the openings with a light-emitting layer composition using an ink-jet head to form the light-emitting layer;

forming a cathode layer over the light-emitting layer; and

(2) incorporating the [manufactured] stacked EL element into the electroluminescent display.